AMENDMENTS TO THE CLAIMS

The listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

1. (Currently Amended) A color solid-state image pickup device comprising:

a plurality of light-receiving sections being arranged on the surface of a semiconductor substrate in a two-dimensional array;

a plurality of complementary color filters, with one complementary color filter stacked on each of at least half of the plurality of light-receiving sections, each complementary color filter blocking incident light of one color of three primary colors, to thereby permit transmission of incident light of remaining two colors of the three primary colors;

at least first and second color signal detecting layers which have the plurality of complementary color filters stacked thereon and are formed so as to be separated in a depthwise direction of the plurality of light-receiving section, the first signal detecting layer detecting a color signal of one color of the light of two colors having passed through the plurality of complementary color filters, and the second signal detecting layer detecting a color signal of remaining one color of the light of two colors having passed through the plurality of complementary color filters; and

a signal reading unit for reading the respective color signals in a distinguished manner, the signal reading unit being connected to the respective color signal detecting layers.

2. (Currently Amended) A color solid-state image pickup device comprising:

a plurality of light-receiving sections being arranged on the surface of a semiconductor substrate in a two-dimensional array;

complementary color filters which are stacked on all or portions of the plurality of light-receiving sections, each complementary color filter blocking incident light of one color of three primary colors, to thereby permit transmission of incident light of remaining two colors of the three primary colors;

at least first and second color signal detecting layers which have the complementary color filters stacked thereon and are formed so as to be separated in a depthwise direction of the plurality of light-receiving section, the first signal detecting layer detecting a color signal of one color of the light of two colors having passed through the complementary color filters, and the second signal detecting layer detecting a color signal of remaining one color of the light of two colors having passed through the complementary color filters; and

a signal reading unit for reading the respective color signals in a distinguished manner, the signal reading unit being connected to the respective color signal detecting layers, wherein a color signal of one color being different from two colors of the three primary colors, the two colors being detected by a first light-receiving section with the complementary color filter stacked thereon, is determined by subjecting, to interpolation processing, at least one detection signal detected by at least one second light-receiving section which is provided around the first light-receiving section and, at least, detects the color signal of the one color being different from the two colors detected by the first light-receiving section.

3. (Currently Amended) The color solid-state image pickup device according to claim 1, wherein three types of the plurality of light-receiving sections are arranged on the surface of the semiconductor substrate, that is, the light-receiving section on which a yellow filter for blocking blue (B) light is stacked, the light-receiving section on which a cyan filter for blocking red (R) light is stacked, and the light-receiving section on which a magenta filter for blocking green (G) light is stacked.

4. (Currently Amended) The color solid-state image pickup device according to claim 1, wherein two types of the plurality of light-receiving sections are arranged on the surface of the semiconductor substrate, that is, the light-receiving section with a yellow filter stacked thereon, and the light-receiving section with a cyan filter stacked thereon.

5. (Currently Amended) The color solid-state image pickup device according to claim 1, wherein two types of the plurality of light-receiving sections are arranged on the surface of the semiconductor substrate, that is, the light-receiving section with a magenta filter stacked thereon, and the light-receiving section on which a green filter for permitting passage of green (G) light is stacked.

6. (Currently Amended) The color solid-state image pickup device according to claim 1, wherein two types of the plurality of light-receiving sections are arranged on the surface of the semiconductor substrate, that is, the light-receiving section with a magenta

filter stacked thereon, and the light-receiving section on which a transparent planarized film is stacked in place of a color filter.

7. (Currently Amended) The color solid-state image pickup device according to claim 1, wherein four types of the plurality of light-receiving sections are arranged on the surface of the semiconductor substrate, that is, the light-receiving section with a green filter stacked thereon, the light-receiving section with a yellow filter stacked thereon, the light-receiving section with a magenta filter stacked thereon, and the light-receiving section with a cyan filter stacked thereon.

8. (Currently Amended) The color solid-state image pickup device according to claim 1, wherein an electric charge path formed from a heavily-doped impurity region, the heavily-doped impurity region extending continuously up to the surface of the semiconductor substrate, is provided in a color signal detecting layer provided in the semiconductor substrate from among the color signal detecting layers.

9. (Currently Amended) The color solid-state image pickup device according to claim 8, wherein a concentration gradient is set such that a doping level of the color signal detecting layer formed as the heavily-doped impurity region and the doping level of the electric charge path continually connected to the color signal detecting layer increase as the color signal detecting layer and the electric charge path approach the signal reading unit.

10. (Original) The color solid-state image pickup device according to claim 1, wherein the depth of the first color signal detecting layer and the depth of the second color signal detecting layer are set in accordance with respective wavelengths of the light of two colors having passed through the complementary color filters.

11. (Currently Amended) The color solid-state image pickup device according to claim 1, wherein on-chip light gathering optical systems are provided on upper portions of the respective light-receiving sections, and one opening of each light-shielding film corresponds to each of the plurality of light-receiving sections.

12. (Currently Amended) The color solid-state image pickup device according to claim 1, wherein the plurality of light-receiving sections are arranged in a square solid pattern on the surface of the semiconductor substrate.

13. (Currently Amended) The color solid-state image pickup device according to claim 1, wherein the plurality of light-receiving sections are arranged in a honeycomb pattern on the surface of the semiconductor substrate.

14. (Currently Amended) The color solid-state image pickup device according to claim 1,

wherein the signal reading unit is a vertical transfer path;

wherein the first color signal detecting layer is a first electric charge storage layer which reads, to the vertical transfer path, stored electric charges corresponding to the

quantity of incident light from the plurality of light-receiving section, as ~~the~~ a first color signal; and

wherein the second color signal detecting layer is a second electric charge storage layer which reads, to the vertical transfer path, stored electric charges corresponding to the quantity of incident light from the plurality of light-receiving section, as ~~the~~ a second color signal.

15. (Original) The color solid-state image pickup device according to claim 14,

wherein the depth of the first electric charge storage layer and the depth of the second electric charge storage layer are set in accordance with respective wavelengths of the light of two colors having passed through the complementary color filters; and

wherein the depth of the electric charge storage layer for storing electric charges corresponding to the quantity of blue (B) incident light ranges from 0.2 to 0.4 μm; the depth of the electric charge storage layer for storing electric charges corresponding to the quantity of green (G) incident light ranges from 0.4 to 0.8 μm; and the depth of the electric charge storage layer for storing electric charges corresponding to the quantity of red (R) incident light ranges from 0.8 to 2.5 μm.

16. (Original) The color solid-state image pickup device according to claim 1, wherein the signal reading unit is a signal line.

17. (Currently Amended) The color solid-state image pickup device according to claim 16, wherein the plurality of light-receiving sections store electric charges in a PN

junction section formed as a result of provision of heavily-doped impurity layers serving as the color signal detecting layers, in the semiconductor substrate; the electric charges are caused to discharge by means of photocarriers produced by the incident light; and the quantity of change in the electric charges, which varies by means of electric discharge, is read as the color signal.

18. (Original) The color solid-state image pickup device according to claim 17,

wherein the depth of the first heavily-doped impurity layer and the depth of the second heavily-doped impurity layer are set in accordance with respective wavelengths of the light of two colors having passed through the complementary color filters; and

wherein the depth of the heavily-doped impurity layer for detecting the blue (B) color signal ranges from 0.1 to 0.3 μm; the depth of said heavily-doped impurity layer for detecting the green (G) color signal ranges from 0.3 to 0.8 μm; and the depth of said heavily-doped impurity layer for detecting the red (R) color signal ranges from 0.8 to 2.5 μm.

19. (Original) The color solid-state image pickup device according to claim 17, wherein an impurity region which is superimposed on the heavily-doped impurity layer for detecting a blue (B) color signal and establishes ohmic contact between the heavily-doped impurity layer and the signal line is formed deeper than the heavily-doped impurity layer.

20. (Currently Amended) The color solid-state image pickup device according to claim 1, wherein

~~a~~ one of the plurality of complementary color ~~filter~~ filters is stacked on each of the plurality of light-receiving sections.

21. (Previously Presented) The color solid-state image pickup device according to claim 1, wherein

the plurality of light-receiving sections are arranged in square grids, and

the plurality of complementary color filters consist of two different color types of complementary color filters stacked alternatively on the plurality of light-receiving sections, with respect to vertical and horizontal directions.

22. (Previously Presented) The color solid-state image pickup device according to claim 1, wherein the plurality of complementary color filters consist of two different color types of complementary color filters stacked alternatively on the plurality of light-receiving sections, with respect to vertical and horizontal directions.

23. (Previously Presented) The color solid-state image pickup device according to claim 1, further comprising a plurality of one color type primary color filters, wherein

the plurality of light-receiving sections are arranged in square grids,

the plurality of complementary color filters consist of one color type of complementary color filter, and

the plurality of one color type complementary color filters and the plurality of one color type primary color filters are stacked alternatively on the plurality of light-receiving sections, with respect to vertical and horizontal directions.

24. (Previously Presented) The color solid-state image pickup device according to claim 1, further comprising a plurality of one color type primary color filters, wherein

the plurality of complementary color filters consist of one color type of complementary color filter, and

the plurality of one color type complementary color filters and the plurality of one color type primary color filters are stacked alternatively on the plurality of light-receiving sections, with respect to vertical and horizontal directions.

25. (Previously Presented) The color solid-state image pickup device according to claim 1, further comprising a plurality of white filters, wherein

the plurality of light-receiving sections are arranged in a honeycomb pixel arrangement,

the plurality of complementary color filters consist of one color type of complementary color filter, and

the plurality of one color type complementary color filters are stacked on of the plurality of light-receiving sections in even/odd columns and the plurality of white filters are stacked alternatively on the plurality of light-receiving sections in odd/even columns.

26. (Previously Presented) The color solid-state image pickup device according to claim 1, further comprising a plurality of white filters, wherein

the plurality of complementary color filters consist of one color type of complementary color filter, and

the plurality of one color type complementary color filters and the plurality of one color type primary color filters are stacked alternatively on the plurality of light-receiving sections, with respect to vertical and horizontal directions.

27. (Currently Amended) The color solid-state image pickup device according to claim 1, further comprising a plurality of one color type primary color filters, wherein

the plurality of light-receiving sections are arranged in square grids,

the plurality of complementary color filters comprise three different color types of complementary color filters, and

each light receiving section of each square grid of the plurality of light-receiving sections has a different one of the three different color types of complementary color filters and the one color type primary color filter stacked thereon.

28. (Previously Presented) The color solid-state image pickup device according to claim 1, further comprising a plurality of one color type primary color filters, wherein

the plurality of light-receiving sections are arranged in square grids,

the plurality of complementary color filters comprise three different color types of complementary color filters, and

in each square grid, the one color type primary color filter and one color type of complementary color filter are arranged in odd/even rows and the other two color types of complementary color filters are arranged in even/odd rows.